

# Rabies in rural areas: challenges and strategies for public health in the state of Maranhão, Brazil

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## INTRODUCTION

Foxes attacking humans and domestic animals in rural areas of Maranhão or bats flying during the day are signs of rabies virus circulation. The importance of rabies as a zoonosis and part of public health, along with its transmission behavior, needs to be emphasized in risk communication to vulnerable areas. This is crucial to change people's perceptions, concerns, and beliefs, thereby promoting rabies prevention and control through sanitary education.

**Objective:** Increase awareness among people living in areas where susceptible animals coexist, especially in regions where the rabies virus circulates.

## METHODS

Through monitoring rabies outbreaks in communities, it was observed that the communication channel among rural populations exposed to the virus needs greater integration between environmental, public health, and animal health agents. This should be done through educational actions adapted to the local reality.

## RESULTS

It is known that vampire bats (*Desmodus rotundus*) and foxes (*Cerdocyon thous*) infected with the rabies virus travel an average of 5 to 10 km in circular or straight-line paths, respectively. Climate changes, deforestation, and territorial disputes among males can influence these movements. Lack of food in certain areas and loss of original forest cover increase contact between these animals and humans. During field visits, it is noted that rural population misinformation facilitates the spread of the rabies virus. There is inadequate awareness of active surveillance in high-risk areas, epidemiological investigation, laboratory diagnosis of suspected rabies cases, or strategic vaccination of domestic herbivores. Risk communication in areas vulnerable to rabies has not been efficient, as has health education. This information is crucial for human and animal health and is a goal of the World Health Organization and the World Organization for Animal Health, but it does not reach rural communities.

## CONCLUSION

The movement of rabid animals and rural population misinformation increase the risk of disease dissemination. Therefore, it is crucial for Official Veterinary Services to improve risk communication and sanitary education through simple and assertive communication, along with strategic surveillance and vaccination, essential measures to meet public and animal health goals in these regions.



# Rabies in domestic and wild animals in Maranhão (Brazil), a retrospective analysis of the foci

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## INTRODUCTION

Human rabies is a progressive and fatal encephalitis, which has been prevented in domestic animals in Brazil with vaccinations. The State of Maranhão has an area of 331,983 km<sup>2</sup>, with rabies occurring frequently, with 6,776,699 inhabitants living there. Domestic herds, which include: 9,428,128 cattle, 97,157 buffaloes, 257,423 horses, 984,666 pigs, 358,464 goats and 319,158 sheep are possible sources of food for the main spreader of the disease (*Desmodus rotundus*), however, there is no population monitoring of wild animals. **Objective:** Considering the importance of rabies, the present study aimed to highlight the epidemiological profile of occurrences and detections in animals and humans in Maranhão.

## METHODS

A retrospective analysis was carried out on the focus of scientific articles published between 1996 and 2021 in electronic databases: Scientific Electronic Library Online (SciELO), Google Scholar, Virtual Health Library (VHL) and U.S. National Library of Medicine (PubMed). The descriptors used in the research were "Rabies in herbivore in Maranhão", "Rabies in humans in Maranhão", "Raiva em herbívoros no Maranhão" and "Raiva em humanos no Maranhão"

## RESULTS

The research located records of 453 outbreaks of animal rabies, on average 18 cases per year. There were 419 cases in cattle (92.49%), 11 cases in horses (2.43%), 7 in sheep (1.55%), 7 in vampire bats (1.55%), 3 in goats (0.66%), 4 in foxes (0.88%), 1 in non-hematophagous bats (0.22%) and 1 case in pigs (0.22%). The most frequent clinical signs in animals were: anorexia, isolation from the herd, sialorrhoea, mydriasis, head tilted to the side, opisthotonus, motor incoordination, and paralysis of the pelvic limbs. The presence of *Desmodus rotundus* increased the probability of rabies occurring 1.517 times. Vaccination coverage in herbivores in the state corresponded to 10.20% of herbivore herds. This helps to explain the absence of the disease in much of the state, especially in regions with a higher concentration of cattle. The disease occurred in areas with less vaccination. The Brazil presented 188 human cases from 2000 to 2017, of which 55 occurred in Maranhão (30.0%). The most frequent form of transmission was bites (81.9%), of which 46.6% were by dogs and 45.9% by bats.

## CONCLUSION

Cases of rabies in animals in the state are endemic, dogs and bats were the biggest aggressors in humans, and bats are important in rural areas in domestic production animals.

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# CONTROL OF ANIMAL RABIES: ANALYSIS OF OUTBREAKS AND PREVENTION STRATEGIES IN BRAZIL

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## INTRODUCTION

It is the responsibility of the Ministry of Agriculture and Livestock (MAPA) to coordinate, regulate, and supervise the actions of the National Program for the Control of Herbivore Rabies (PNCRH). The MAPA also defines strategies for the prevention and control of rabies and accredits laboratories for the diagnosis of rabies and other diseases with nervous system symptoms.

**Objective:** To present data and strategies related to the control and monitoring of animal rabies in Brazil, highlighting the prevalence of the disease among different species, the geographical distribution of outbreaks, and the normative and strategic measures adopted by the PNCRH for rabies prevention and control.

## METHODS

A search was conducted for rabies outbreaks in production and wild animals registered in MAPA's database via the link: [https://mapaindadores.agricultura.gov.br/publico/extensions/Saude\\_animal/Saude\\_animal.html](https://mapaindadores.agricultura.gov.br/publico/extensions/Saude_animal/Saude_animal.html) from 2005 to 2023.

## RESULTS

The research conducted on the MAPA website revealed 17,268 reported animal rabies outbreaks in the last 19 years, with 14,499 (84.0%) outbreaks in cattle, 1,446 (8.4%) in equines, and 1,158 (6.7%) in wildlife, including hematophagous and non-hematophagous bats, foxes, and nonhuman primates, representing 99.1% of the outbreaks. Bubalines, sheep, goats, and swine accounted for only 0.9%. The states of Mato Grosso, Goiás, Minas Gerais, Espírito Santo, São Paulo, Paraná, and Rio Grande do Sul concentrated 65.65% of the outbreaks, coinciding with the highest density of cattle and equine herds. Despite the high number of outbreaks, there was a noticeable decline over time, from 1,442 outbreaks in 2005 to 466 in 2023, indicating the effectiveness of rabies control actions. Normative Instruction N°. 50/2013, in Art. 2, requires any Brazilian citizen to immediately notify the Official Veterinary Service of the occurrence or suspicion of rabies. The PNCRH's strategies include active surveillance in high-risk areas, accessible laboratory diagnosis, epidemiological and laboratory investigation of suspected cases in domestic herbivores and bats, strategic vaccination in outbreaks, monitoring of hematophagous bat shelters, and risk communication in vulnerable areas.

## CONCLUSION

In the past 19 years, 17,268 animal rabies outbreaks have been reported to MAPA, mainly in cattle, equines, and wildlife, with a significant reduction from 1,442 outbreaks in 2005 to 466 in 2023. The effectiveness of rabies control actions highlights the importance of immediate notification and PNCRH strategies

# FREQUENCY OF ANIMAL AGGRESSIONS ON HUMANS IN THE MUNICIPALITY OF PEDREIRAS, MARANHÃO (BRAZIL), FROM JANUARY 2021 TO MAY 2024

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## INTRODUCTION

Human rabies is an acute, progressive, and fatal encephalitis observed under the One Health triad of animals, environment, and humans. It requires multisectoral attention and is preventable. Victims of animal attacks are treated by multidisciplinary teams.

**Objective:** To analyze the occurrence of animal attacks on humans in the municipality of Pedreiras, Maranhão (Brazil).

## METHODS

Data on human aggressions caused by domestic and wild animals were provided by the Municipal Health Department of Pedreiras. The municipality, located in Maranhão, covers an area of 288.43 km<sup>2</sup> and has a population of 37,050 inhabitants.

## RESULTS

From January 2021 to May 2024, 1,124 attacks on people were reported: 830 (73.8%) by dogs, 227 (22.9%) by cats, 7 (0.6%) by non-hematophagous bats, 14 (1.2%) by monkeys, 4 (0.4%) by foxes, 5 (0.4%) by pigs, 1 (0.1%) by horses, 1 (0.1%) by raccoons, and 5 (0.4%) by rats. There were no human rabies cases. According to the Brazilian Ministry of Health, dogs and cats are the main sources of infection, followed by bats, monkeys, raccoons, and foxes in rural areas. Production animals represent a medium risk, and rats a low risk. The National Rabies Prophylaxis Program (PNPR), created in 1973, implemented canine and feline rabies vaccination, significantly reducing human rabies mortality rates in Brazil. Prophylaxis includes pre-exposure treatment for individuals at permanent risk and post-exposure treatment for attack victims, involving thorough wound cleaning and administration of Anti-Rabies Serum (SAR) or Human Rabies Immunoglobulin (HRIG). For attacks by bats and wild mammals, four doses of vaccine are administered on days 0, 3, 7, and 14. Preventive actions are shared responsibilities among veterinarians and other health professionals.

## CONCLUSION

Dogs and cats are the main aggressors (96.7%) in urban areas, while foxes, monkeys, raccoons, and bats are important in rural areas.

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